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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/593,891	06/14/2000	Sadao Nakayama	NFC DP-624	8215

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HAYES, SOLOWAY P.C.
130 W. CUSHING STREET
TUCSON, AZ 85701

EXAMINER	
CHU, CHRIS C	

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 09/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/593,891	NAKAYAMA, SADAO	
	Examiner	Art Unit	
	Chris C. Chu	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 9, 12 and 14 - 17* is/are rejected.

7)☒ Claim(s) *10,11 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on May 3, 2004 has been received and entered in the case.

Claim Objections

2. Claims 2, 3, 12 and 17 are objected to because of the following informalities:

(a) In claim 2, line 2, the term "a terminal" should be --a first terminal--;

(b) In claim 3, the term "a second bonding wire" should be --a bonding wire--, because there are no first bonding wire in the claims;

(c) In claim 12, line 2, the phrase "third pad and said fourth wiring pattern" should be --third pad, said fourth pad and said wiring pattern--, because said fourth wiring pattern lacks antecedent basis and consists with other claims; and

(d) Claim 17 is objected to under 37 CFR 1.75(c) as being in improper form because this dependent claim depends on itself. See MPEP § 608.01(n). For the examining purpose, Examiner treats this claim as a dependent claim of claim 9.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 9, 12, 14, 15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Mori (U.S. Pat. No. 5, 903, 049).

Regarding claim 9, Mori discloses in e.g., Fig. 1 and column 2, line 33 – column 3, line 36 a semiconductor device, comprising:

- a package substrate (8) having a first pad (at the connection area on the elements 8);
- a first chip (1b) having a second pad (4b) and formed on said package substrate;
- a wiring substrate (2a) formed on said first chip, said wiring substrate having a third pad (at the connection area to the wire 7 on the element 3a), a fourth pad (at the connection area to the pad 4a on the element 3a) and a wiring pattern (the wiring circuit of the element 3a that locates between the third and fourth pads) connected between said third and fourth pads; and
- a second chip (1a) having a fifth pad (4a) and formed on said second chip.

Regarding claim 12, Mori discloses in e.g., Fig. 1 one of said third pad, said fourth pad and said wiring pattern being in direct contact with one of said second and fifth pads.

Regarding claim 14, Mori discloses in e.g., Fig. 1 and column 2, line 33 – column 3, line 36 a semiconductor device, comprising:

- a package substrate (8) having a plurality of first pads (at the entire connection area that is connected by the wiring 7s on the elements 8 at the left side in Fig. 1);
- a first chip (1b) having a plurality of second pads (4b) and formed on said package substrate;

- a wiring substrate (2a) formed on said first chip, said wiring substrate having a plurality of third pads (at the connection area under the wire 7 and on the element 3a), a plurality of fourth pads (at the connection area under the pad 4a and on the element 3a) and a plurality of wiring patterns (the wiring circuit of the element 3a that locates between the third and fourth pads), each of said wiring patterns connecting a corresponding one of said third pads and a corresponding one of said fourth pads; and
- a second chip (1a) having a plurality of fifth pads (4a) and formed on said second chip; wherein said fourth pads are connected to said fifth pads, said first pads are connected to said second pads (by the bottom wiring 7 and the element 3b), and a first wiring (the upper wiring 7 at the left side in Fig. 1 that connects the element 3a and the substrate) is provided to connect said first pads and third pads.

Regarding claim 15, Mori discloses in e.g., Fig. 1 one of said first pads being connected to one of said second pads as well as one of said third pads.

Regarding claim 17, Mori discloses in e.g., Fig. 1 said wiring substrate (2a) bring sheet or board wiring substrate (2a).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1 - 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takiar et al. '398 in view of Rostoker '570.

Regarding claims 1, Takiar et al. discloses in e.g., Fig. 6, Fig. 7 and column 2, lines 49 – 57 a stacked semiconductor storage device (Since Takiar et al. discloses the stacked MCMs is all memory devices, it meets this preamble. Furthermore, this limitation has not been given patentable weight because this preamble merely states the purpose or intended use of the invention rather than any distinct definition of any of the claimed invention's limitations) comprising, in combination,

- a lower chip (136 or/and 158) and an upper chip (140 or/and 162) superimposed on a substrate (142 or/and 156),
- said semiconductor storage device further comprising:
- a wiring substrate (138 or/and 160; column 7, lines 9 – 15) having wiring patterns (at the wiring patterns in Fig. 2 and column 6, lines 36 – 57) thereon, interposed between and in direct contact with both said lower chip and said upper chip, for relaying electric connection (at the 5th pad of the elements 168 from the right-down side) between bonding pads (pads on the element 162) on said upper chip (162) and bonding pads (at the connection area or elements 168) on said substrate (156),
- wherein the bonding pads on said upper chip (162) are arranged in a line running perpendicular (the up-and-down array of pads on the upper chip 162 is perpendicular to the right-to-left array of pads 168 on the substrate 156) to a line of bonding pads (at the right-to-left array of pads 168) on the substrate (156);

- wherein said upper chip (162) has an upper and a lower surface, said lower surface facing said substrate.

However, Takiar et al. does not disclose the bonding pads on said upper chip that connect to the bonding pads of said substrate being disposed on the lower surface of said upper chip. Rostoker teaches in Figs. 1a and 1b bonding pads (108) on a chip that connects to bonding pads (at the connection areas on the elements 112a) of a substrate (110) being disposed on the lower surface of the chip. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Takiar et al. by using the other end of the wiring pattern to connect to the terminal on the surface of the lower chip as taught by Rostoker. The ordinary artisan would have been motivated to modify Takiar et al. in the manner described above for at least the purpose of providing a high I/O semiconductor die (column 3, lines 24 – 35).

Regarding claim 2, Takiar et al. discloses in e.g., Fig. 6, Fig. 7 and column 2, lines 49 – 57 said wiring pattern (160) being connected to a terminal (at the pads on the element 162) on a surface of the upper chip (162), a second terminal (at the 5th pads from right-down side on the element 160) being connected to a terminal (at the pads 168) on a surface of the substrate (156), and said wiring pattern (160) connecting the second terminal (at the pads on the element 160) to said terminal (pads on the element 162) on a surface of said upper chip (162).

Regarding claim 3, Takiar et al. discloses in e.g., Fig. 6 and Fig. 7 a second bonding wire (any wiring bonds in the structure) for connecting said terminal (168) of the surface of said substrate (156) with said second terminal (at the 5th pads from right-down side on the element 160).

Regarding claim 4, Takiar et al. and Rostoker disclose there being provided a wiring pattern (160) whose one end is connected to a terminal on a rear surface of said upper chip, and whose other terminal is (electrically) connected to a terminal on a surface of said lower chip.

Regarding claims 5 and 6, Takiar et al. discloses in e.g., Fig. 6 and Fig. 7 said terminal of the surface of said lower chip (158) being connected to said terminal of the surface of said substrate (156) by a third bonding wire.

Regarding claim 7, Takiar et al. and Rostoker disclose the claimed invention except that the wiring substrate being a board instead of a sheet. Since it is known in the art that a sheet wiring substrate is an equivalent structure of the board wiring substrate. Therefore, because these two "sheet wiring substrate" and "board wiring substrate" were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute the sheet wiring substrate for the board wiring substrate. The ordinary artisan would have been motivated to modify Takiar et al. in the manner described above for at least the purpose of decreasing height of the package.

Regarding claim 8, Takiar et al. discloses in e.g., Fig. 6 and Fig. 7 said wiring substrate (142 or/and 160) being a board wiring substrate.

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mori.

Mori discloses the claimed invention except that the wiring substrate being a board instead of a sheet. Since it is known in the art that a sheet wiring substrate is an equivalent structure of the board wiring substrate. Therefore, because these two "sheet wiring substrate" and "board wiring substrate" were art-recognized equivalents at the time the invention was made, one

of ordinary skill in the art would have found it obvious to substitute the sheet wiring substrate for the board wiring substrate. The ordinary artisan would have been motivated to modify Mori in the manner described above for at least the purpose of decreasing height of the package.

Allowable Subject Matter

8. Claims 10, 11 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 10 contains allowable subject matter because none of references of record teach or suggest, either singularly or in combination, at least the limitation of a first bonding wire connecting a first pad and a third pad and a second bonding wire connecting a fourth pad and a fifth pad when the fourth pad on the wiring substrate is connected to the fifth pad on a second chip while the fourth pad, a third pad and a wiring pattern are formed on a wiring substrate and the fourth pad is connected to a third pad by a wiring pattern.

Claims 11 and 13 are dependent claims of the objected claim (claim 10), these claims are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (e.g., claim 10).

Response to Arguments

9. Applicant's arguments with respect to claims 1 - 8 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c.
August 17, 2004

GEORGE ECKERT
PRIMARY EXAMINER